Volumetric Limits for Carry in a Spacesuit

Y. Hernandez[1], K. H. Kim[2], E. Benson[1], S. L. Rajulu[3]

[1]KBR, TX, [2]Leidos, TX, [3]NASA Johnson Space Center, TX

Though there is a plethora of ergonomic guidelines for manual material handling, including maximum weight limits, there is not much guidance for the largest size of an object that a person can carry. Moreover, given the new Artemis space program's intent to reestablish and maintain human presence on the Moon, there is a need to set manual material handling requirements for the partial gravity environment. Lunar surface carry limits while wearing a pressurized spacesuit is chief among them. Specifically, volumetric limits are required to determine the maximum dimensions of an item that a crewmember will be able to carry on the lunar surface. This study will assess spacesuit motion data to determine acceptable locations where the hand can be positioned for carrying an object, as hand position will vary with the crewmember anthropometry, spacesuits constraints and mechanism. Maximum volume limits will be derived from clearances between the suit and the gloved hand. The mobility of the suit and task contexts (e.g., terrain types, ground clearance) will also be taken into consideration to ensure that the volume being carried does not interfere with suit hardware or impart any mobility restrictions. The specific analysis methods and outcomes will be detailed in the final proceeding. The outcome of this study is expected to provide guidelines for maximum volumes that can be carried both two-handed and one-handed while wearing a spacesuit.